INDIANA DEPARTMENT OF TRANSPORTATION

INTER-DEPARTMENT COMMUNICATION

*Standards Section **C** Room N642*

Writer's Direct Line
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DESIGN MEMORANDUM No. 00-13
TECHNICAL ADVISORY

TO: **All Design, Operations, and District Personnel, and Consultants**

FROM: ***/s/ Anthony L. Uremovich***
Anthony L. Uremovich
Acting Design Policy Engineer
Contracts and Construction Division

SUJECT: **Nested Guardrail and Cable Terminal Anchor**

EFFECTIVE: **January 17, 2001, Letting**

The details for nested guardrail shown on Standard Drawings 601-WBGA-04 and –05 have been superseded by the nested guardrail configuration shown in the attached recurring plan details. This configuration should be used where there is inadequate cover for driving full-length guardrail posts. The configuration may be used within a longer run of W-beam guardrail, or may be used alone, depending on the length of guardrail need. This configuration has been crash tested in accordance with National Cooperative Highway Research Program (NCHRP) Report 350 requirements, and approved for use by the FHWA on the National Highway System.

The configuration may only be used as one complete 30.48 m (100 lft) unit. The designer should determine the number of modified posts, if they are required, to determine the pay quantity. The designer should also determine the end treatment requirements.

The cable terminal anchor system, also FHWA approved, is shown in the attached recurring plan details. The cable terminal anchor system may be used at the outgoing end of any W-beam guardrail run that is not exposed to oncoming traffic. It may be used as the equivalent of the W-beam anchorage guardrail ordinarily required 7.62 m (25 lft) beyond the length of need, where space limitations do not permit placement of such a guardrail run.

The designer should call for the attached Recurring Special Provision 601-R-386, and the appropriate Recurring Plan Details 601-R-386d, until supplemental specifications and standard drawings take effect which show these changes. The new code numbers, pay items, and pay units are as follows:

601-06854 Guardrail, W-Beam, Nested ..... Each
601-06856 Modified Posts, Nested Guardrail ..... Each
601-06855 Guardrail, W-Beam, Cable Terminal Anchor ..... Each

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Attachments

[F:\Des\Signed\0013-ta]

W-BEAM NESTED GUARDRAIL AT LARGE DRAINAGE STRUCTURES
IN LOW-FILL CONDITIONS

The Standard Specifications are revised as follows:

SECTION 601, LINE 28, INSERT AS FOLLOWS:

the locations shown on the plans. *In locations where conditions will not allow the use of 2130 mm (7 ft) posts, 1830 mm (6 ft) posts may be substituted when approved.*

SECTION 601, BEGIN LINE 148, DELETE AND INSERT AS FOLLOWS:

601.12 Method of Measurement. Guardrail, *guardrail with rubrail,* shop curved guardrail, adjusting guardrail height, guardrail removal, and resetting guardrail will be measured by the meter (linear foot) along the top of the rail element, complete in place. Nested guardrail will be measured ~~by the meter (linear foot) along the top of the nested rail elements, complete in place~~ *per each 30.48 m (100 lft) run placed. Modified posts for nested guardrail will be measured per each, complete in place*. Guardrail transitions, *W-Beam guardrail cable terminal anchors,* and guardrail end treatments will be measured per each, complete in place. *Guardrail buried end treatments type II will be measured per each. Impact attenuators and impact attenuator spare parts packages will be measured per each for the type and width and test level, complete in place*. The curved W-beam guardrail connector system and the curved W-beam guardrail terminal system will be measured per each for the type specified. Grading at guardrail end treatments, the reflectorization of guardrail end treatments, and concrete used in anchoring guardrail end treatments will not be measured for payment.

601.13 Basis of Payment. Guardrail will be paid for at the contract unit price per meter (linear foot) for the specified ~~combination of~~ post ~~length and~~ spacing. Nested guardrail will be paid for at the contract price per ~~meter (linear foot) without regard to the post length or spacing~~ *each 30.48 m (100 lft) run, complete in place for guardrail, W-Beam, nested. W-Beam guardrail cable terminal anchor will be paid for at the contract unit price per each, complete in place. Modified posts for nested guardrail will be paid for at the contract unit price per each for modified posts, nested guardrail. W-Beam guardrail with rubrail will be paid for at the contract unit price per meter (linear foot) for guardrail, WR-Beam complete in place*. Shop curved guardrail, adjusting guardrail height, guardrail removal, and resetting guardrail will be paid for at the contract unit price per meter (linear foot). Guardrail transitions and guardrail end treatments will be paid for at the contract unit price per each for the type specified. *Guardrail buried end treatments type II will be paid for at the contract unit price per each, complete in place. Impact attenuators and impact attenuator spare parts packages will be paid for at the contract unit price per each for the type and width, and test level specified.* The curved W-beam guardrail connector system and curved W-beam guardrail terminal system will be paid for at the contract unit price per each for the type specified, complete in place.

Where existing guardrail height is adjusted, such work will be paid for at the contract unit price per meter (linear foot). The costs of removal, all necessary storage, new adjustable post brackets, attachment of rail section, and miscellaneous nuts and bolts as required shall be included in the cost of adjust guardrail height.

Payment will be made under:

Metric Pay Item **Metric Pay Unit Symbol**
(English Pay Item **English Pay Unit Symbol)**
Pay Item **Metric Pay Unit Symbol (English Pay Unit Symbol)**

Guardrail, Adjust Height .....m (LFT)
Guardrail Connector System, W-Beam, Curved, _____ ..... EACH
type
Guardrail End Treatment, _____ ..... EACH
type
Guardrail, Remove.....m (LFT)
Guardrail, Reset .....m (LFT)
Guardrail, Terminal System, W-Beam Curved, _____ ..... EACH
type
Guardrail Transition, _____ ..... EACH
type
Guardrail Transition, VH, _____ m Spacing ..... EACH
(Guardrail Transition, VH, ___ ft.-___ in. Spacing ..... EACH)
Guardrail, W-Beam, _____ m Spacing .....m
(Guardrail, W-Beam, ___ ft.-___ in. Spacing..... LFT)
Guardrail, W-Beam, Cable Terminal Anchor..... EACH
Guardrail, W-Beam, Double Faced, _____ m Spacing.....m
(Guardrail, W-Beam, Double Faced, ___ ft.-___ in. Spacing ..... LFT)
~~Guardrail, W-Beam, Long Post, _____ m Spacing.....m~~
~~(Guardrail, W-Beam, Long Post, ___ ft.-___ in. Spacing..... LFT)~~
Guardrail, W-Beam, Nested .....~~m (LFT)~~ *EACH*
Guardrail, W-Beam, Shop Curved, _____ m Spacing.....m
(Guardrail, W-Beam, Shop Curved, ____ Ft.-____ in. spacing..... LFT)
Guardrail, WR-Beam.....m (LFT)
Impact Attenuator, _____, _____ ..... EACH
Type-width test level
Impact Attenuator Spare Parts Package, _____,
type-width
_____ ..... EACH
test level

The substitution of 1830 mm (6 ft) posts for 2130 mm (7 ft) posts where conditions will not allow the use of the longer post will be at the same contract unit price of the longer post.

The costs of resetting guardrail shall include the removal, necessary storage, resetting and replacement of damaged or missing parts and new posts as required.

The cost of excavation, concrete footings, reinforcement, and structural steel tubing required for modified posts, nested guardrail, shall be included in the cost of the pay item.

The cost of reflectorization of *impact attenuators and* guardrail end treatments shall be included in the *respective* pay items ~~for guardrail end treatments~~.

The cost of all grading required for the guardrail buried end treatment shall be included in the cost of guardrail end treatment type II.

The cost of earthwork, grading, and transition panel if required, and PCC pad shall be included in the cost of impact attenuator.

SECTION 910, BEGIN LINE 546, INSERT AS FOLLOWS:

6. For breakaway cable terminal, *and cable terminal anchor system,* the rail element, standard bolts, nuts,
and washers shall be in accordance with 910.09(a) and requirements 1 and 3 of 910.11(a).

7. For cable terminal anchor system, the anchor bracket, end plate, soil plate, bearing plate, strut and yoke shall be in accordance with AASHTO M 270M grade 250. They shall be zinc coated after fabrication in accordance with AASHTO M 111. The steel tube shall be in accordance with ASTM D 500 grade B and zinc coated in accordance with AASHTO M 111. The post sleeve shall be in accordance with ASTM A 53 grade B and zinc coated in accordance with AASHTO M 111. The stud shall be in accordance with ASTM F 568 class 8.8, and zinc coated in accordance with AASHTO M 111. The threads shall be in accordance with ANSI B1.13M and shall be M24 x 3 class 6g pitch. The swaged fitting shall be in accordance with ASTM A 576 grade 1035, zinc coated in accordance with AASHTO M 111, and shall be annealed for cold swaging. A lock pin hole to accommodate a 6 mm plated spring-steel pin shall be drilled through the head of the swaged fitting.

SECTION 910, BEGIN LINE 577, INSERT AS FOLLOWS:

The wire rope used in the cable ~~assembly~~ *assemblies* shall be in accordance with AASHTO
M 30 and shall be 19 mm (3/4 in.) preformed, 6 by *1*9, wire strand core or independent wire rope core (IWRC), galvanized, right regular lay, manufactured of improved plow steel, with a minimum specified breaking strength of 190 kN (42,800 lb). The swaged